



## **Radiophysical Methods for Biomedical Applications: Challenges and Problems**

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At present in connection with the active development of radiophysical methods and tools, we get the absolutely new great possibilities for application of these approaches in biomedicine. The devices based on new physical and technological principles for biomedicine have been developed.

Human body is a dynamic self-governing system whose stability (homeostasis) provided by simultaneous operation of distributed physiological systems for neuroregulation, blood circulation, metabolism, etc.

Continuous operation of all life support systems is reflected in real time on one side in the complex picture of the physical fields and radiation emitted by the human body, and on the other side in the parametric changes of natural background fields and radiation, that normally surround a person. Application of the actual radiophysical methods for precise measurements and dynamic mapping of these fields, radiation and changes of the background field gives us the possibilities for development of new methods for non-invasive medical diagnostics that is a very important component in preventive medicine.

One of the clear example is the development of a quasi-static electric impedance, electric field and magnetic field computer tomography for a human body. The results of the application this type tomography allow to allocate the changes in tissue electric impedance that take place in pathological tissue. Mentioned changes come much earlier than the changes in tissue density that could be registered by regular X-ray Computer tomography. So, mentioned new technology could be very useful for early medical diagnosis.

The other clear example is the development of infrared thermography for early differential medical diagnosis. It is well known, that the aggregation of cancer cells has a little bit higher temperature in comparison with the neighbor healthy cells. So, it is necessary to make precise measurements of the temperature to allocate the dangerous area. The special devices already developed and applied successfully. This approach provides early medical diagnosis.

Actual radiophysical methods could be successfully applied not only for medical diagnosis but for treatment also. Description of the experimental equipment for precise measurements and medical diagnosis examples are presented in the report.

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2. A. Vasnev, Yu. Maslennikov, M. Primin, I. Nedayvoda, O. Sitnikova, A. Nogovitsin, Yu. Gulyaev. "Magnetocardiographic Phenotyping", *Journal of Electrocardiology* **44**, 2, 2011, e37-e38